DOCUMENT RESUME

ED 222 858 CS 006 846

AUTHOR Barton, David; Hamilton, Mary E.
TITLE Awareness of the Segmental Structure of English in Adults of Various Literacy Levels.
SPONS AGENCY National Inst. of Education (ED), Washington, DC.
PUB DATE 20 Dec 80
GRANT NIE-G-80-0040
NOTE 20p.; For related documents see CS 006 845-847.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Adult Basic Education; Adults; Error Analysis (Language); Language Research; *Language Skills; Linguistic Theory; *Literacy; *Metacognition; *Reading Ability; Reading Research; Reading Skills; *Structural Analysis (Linguistics)
IDENTIFIERS *Metalinguistic Awareness; *Segmentation (Verbal)

ABSTRACT

As part of a wider study of metalinguistic skills, a study examined the segmental awareness skills of adults with a low level of literacy and compared them with the skills of more literate adults of similar backgrounds. Subjects, 60 adults enrolled in adult education classes, were divided into three groups of 20 according to reading level. Structured interviews covered several different aspects of segmental awareness. Results confirmed that segmental awareness varied with reading level. Specifically, the components that gave rise to the most errors and accounted for differences between the groups were those measuring word segmentation and those measuring smaller units within a whole--in short, problems of identifying "units within units." Results also showed that most segmentation errors occurred where an element of convention entered into the decision as to whether the form should be written as one word. Literates, however, were more likely to treat contractions as one word. These results seem to indicate that certain aspects of segmental awareness are related to literacy, while others are not. (JL)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED222858

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
This document has been reproduced as received from the person or organization originating it.
Minor changes have been made to improve reproduction quality.
Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
David Barton
Mary E. Hamilton
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

AWARENESS OF THE SEGMENTAL STRUCTURE OF ENGLISH, IN ADULTS OF VARIOUS LITERACY LEVELS.[1]

David Barton and Mary E. Hamilton
Department of Linguistics
Stanford University

December 20, 1980

ABSTRACT

This paper examines the metalinguistic skills of adults with a low level of literacy, and compares them with the skills of more literate adults who are similar in background and years of schooling. Aspects of segmental awareness related to sentences and words were investigated in 60 adults, using a highly structured interview. Errors of segmental awareness were made by all subjects; the number of errors varied with literacy level. The types of segmentation which gave most difficulty were those concerned with identifying 'units within units', the smaller the units being segmented, the greater the difficulty. Errors occurred most commonly where the segmentation is to some extent a convention of the writing system. Subjects' syllabifications of certain words and their treatment of contractions were shown to vary with literacy level. The paper discusses adults' segmental awareness in relation to results found in children. It also discusses the effects that literacy has in giving people greater flexibility with language and an additional way of operating on language.

---

[1] This research was supported by a grant from the National Institute of Education(#NIE-G-80-0040). We gratefully acknowledge the support of Charles A. Ferguson through all phases of the research. We would like to thank the staff and students of the adult education centers where we conducted the research, especially those at the San Francisco Adult Learning Center. We would also like to thank Bill Arsenio and Rebecca Hovey, who assisted in data collection and coding.

CS006846

1. INTRODUCTION

1.1

We can carry out the primary functions of language, speaking and listening, without any particular reflection on or awareness of the language we are using. Language is the medium used to achieve other ends, such as communication, and normally we do not need to focus on the form of language to achieve these ends.

Even though we do not need to focus on the form of language in order to speak it, we are able to become aware of many aspects of linguistic functioning. We can do this in various ways and it serves many uses, ranging from spontaneous self-correction in speech to sophisticated punning and joke telling. Several aspects of this metalinguistic awareness have been studied, especially in children. (see, for example, Sinclair et al 1978.)

One place where some awareness is necessary, where the forms of language need to become concrete, is in learning to read and write. When learning to read and write we normally do this by focussing on language as an object independent of the medium of speech. This has been stated by several researchers, e.g Mattingly 1972, Downing 1979.

In this paper we concentrate on one particular linguistic skill, the ability to segment speech into discrete units, and awareness of this skill. Speech consists of a continuous stream of sound and in understanding speech one of the first tasks of the skilled hearer is to analyze it into appropriate length units. Learning to segment speech appropriately is one of the major tasks for the language learner, whether child or adult. Thus, segmentation is involved in the primary linguistic activities of hearing and speaking. However, awareness of these abilities may or may not be necessary for speaking and hearing. In our writing system, in learning to read some awareness of the segmental structure of the language is necessary. As well as requiring some awareness, the act of learning to read also provides some information about the segmental structure of the language: our writing system provides an explicit segmentation of the language into word length units and gives information about the phonemic structure of the language.

We will refer to awareness of the segmental structure of language as segmental awareness. The paper examines the segmental awareness skills of adults with a low level of literacy and compares them with the skills of more literate adults who are similar in background and years of schooling. The paper discusses what awareness literacy gives adults. It discusses adults' awareness in relation to the

results found with children, in an attempt to disentangle the effects of literacy from the effects of general cognitive development. The data come from highly structured interviews of adults attending adult education classes.

1.2

Most studies of segmentation abilities have been of children, and it is to these studies that we first turn for hypotheses of potential difficulties that adults might have. There are many aspects of the segmental structure of English which children find difficult and where non-literate adults might be expected to experience difficulty. These revolve around the difficulty of breaking units of speech into smaller units. Thus, children experience difficulty in breaking sentences into phrases, and phrases into words; they have more difficulty breaking words into syllables and most difficulty breaking monosyllables into sound segments (e.g. Fox & Routh 1976; see also review by Clark 1978). When breaking sentences into parts, the specific places where children have difficulty include: nouns with articles, such as a desk, and verb forms, such as is drinking, and have to go (Holden & McGinitie 1972; Karpova 1977).

Below the level of the word, as well as difficulties with segmentation, we can also look at the nature of the syllabifications. When breaking words into syllables there are often alternate ways that the words can be syllabified.One particular situation which is of interest when discussing literacy concerns words where the spoken form differs from the written form in terms of syllabic structure. An example of this is family which has a presumed underlying form of 3 syllables and is written with 3 syllables; however, in normal speech the reduced vowel is eliminated and the word is pronounced with 2 syllables. (Such words have been studied in children by Ehri & Wilce, in press.)

The child research provides one source of hypotheses of potential difficulties which adults might have and which might be dependent on levels of literacy. Another source of hypotheses is to look at what specific cognitive skills literacy might bring. There is the widespread assumption that,with age, people develop abilities to handle more abstract,logical concepts and to distance themselves from immediate events. This also implies the ability to reflect on one's own activities. A few psychologists have suggested that these abilities may be critically dependent on the acquisition of literacy and experience with written or 'schooled' language (Vygotsky 1962;Olson & Nickerson 1978). Olson & Nickerson develop this in detail, arguing that the experience of seeing language written down objectifies it;

this encourages the attitude of seeing 'words' and 'sentences' as things that exist in their own right, that can be held in mind, reflected upon, moved around and related in different ways.

If we apply the general idea that literacy gives the ability to 'hold in mind' to the problem of segmental awareness, then the specific areas where we might expect non-literate adults to experience difficulty are: repeating a sentence word for word; slowing down to say a sentence one word at a time (although linguists assume this not to be a problem for adults, e.g. Sapir 1921; Lyons 1968); and identifying a specific word in a sentence.

2. SUBJECTS

Subjects were adults attending adult education classes. The following criteria were used for including subjects in the study: they had to be monolingual; to have been educated in the United States; not to have attended school beyond high school (apart from the classes they were currently enrolled in); and to have no known speech, hearing or other motor problems. They were interviewed within one month of beginning classes. Participation was voluntary. There were 60 subjects and for the analysis they were divided into three groups of 20 subjects, according to their reading level. The grade equivalent reading levels were taken from records of tests administered when they entered the classes. The lower level students were specifically attending literacy classes, while those in the higher groups were taking a variety of basic education classes.

The criteria for assigning subjects to the groups were:the basic level students had to have reading levels below fourth grade and the high level group had to be above seventh grade (with the medium group coming between these two levels). We will refer to the basic group as the non-literates.This is not completely accurate since they could read to some extent. It would be very difficult to study completely non-literate adults with an appropriate control group. We accepted up to fourth grade level for the basic group because there appear to be qualitative changes in reading beyond this level (see,for example,Gleitman & Gleitman 1979). This also means that the subjects in the basic group were at the same reading level as the subjects in much of the child research. The high level subjects acted as a literate control group with similar backgrounds and level of schooling. Their level of reading was adequate to be considered completely literate and was appropriate for their level of schooling (see Hunter & Harman 1979).

3. THE INTERVIEW

The subjects were interviewed individually. The interviews lasted approximately 40 minutes and were tape recorded.

The interviews were highly structured and were concerned with various aspects of metalinguistic awareness. They consisted of: questions on the segmentation of sentences, phrases and words; definitions and judgments of words; judgments of oral and graphic items; and background questions concerning attitudes to language and education. This paper deals exclusively with the data on segmental awareness and we will describe in detail here only the parts of the interview related to this. (Other parts are described in Hamilton & Barton 1980). This method, of using a structured interview, seemed to be the most appropriate for adults. The exact form of the interview evolved from extensive piloting.

All the questions on segmentation were presented orally. The subjects were presented with a sentence and asked various questions about it. The questions were based on the likely areas of difficulty discussed in section 1.2. In addition, we had analyzed the written work of adults attending literacy classes and we included types of errors found in their writing. These were phrases with a unitary meaning and compound words which were composed of words. Piloting with highly literate adults suggested that contractions were confusing and we included some examples of these. Examples of all the items were mixed up and put into sentences. To ensure that the sentence strucures were familiar to the subjects, the sentences were adapted from the written work of students . (The interviewer always said the sentences and phrases with normal conversational intonation.) For example, the interviewer asked the following questions:

Can you say this sentence back to me 'Everything's going to be different'.
Now can you say it one word at a time.
How many words is that?
(If answers to the first two questions were inconsistent:
'Can you count them out?')
What's the first word?
Can you break it into parts?
What's the last word?
Can you break that into parts?

There were six such sentences and most of the segmentation data were collected in this part of the interview. The six sentences were:
I feel better today.
I try to be myself.
Everything's going to be different.

She didn't know where to catch the train.
He's always getting into trouble.
My family means a lot to me.

In addition, in a later part of the interview where judgments were being elicited, some items were also relevant to the segmentation questions. This was where subjects were asked whether specific words and phrases were words, and if so, how many words they consisted of. The items were more or less, rock and roll, around and enough. Two words which had to be broken into parts, comfortable and rich, also came from this later part of the interview.

Thus, the interview covered several different aspects of segmental awareness. In all, the items on segmentation were as follows: (The numbers in parentheses are the number of instances of each. Since each word served several functions in the interview, there are different numbers of instances for each variable.):

1. Difficulty repeating a sentence word for word (6 items).

2. Difficulty slowing down when saying a sentence one word at a time (6 items).

3. Forgetting part of a sentence when saying it one word at a time (6 items).

4. Difficulty with the task of counting the number of words in a sentence (3 items).

5. Specific errors in counting the number of words in a sentence (3 items). Note the difference between this and the previous variable: there can be apparent difficulties with the task of counting without there being errors in counting.

6. Inconsistency between when segmenting to give the sentence one word at a time and when segmenting to count the number of words in the sentence (3 items).

7. Segmentation errors. It is difficult to give the number of possible segmentation errors in the sentences. We have taken the number of items as the number of problems deliberately included in the sentences (15 items).

8. Problems identifying specific words in a sentence, such as the first word or the third word (5 items).

9. Errors in identifying the numbers of words in phrases and words (4 items).

10. Difficulty in breaking multi-syllabic words into syllables (5 items).

11. Difficulty in giving the first sound in words (4 items).

12. Difficulty in breaking monosyllabic words into sound segments (2 items).

4. RESULTS

4.1 OVERALL SEGMENTAL AWARENESS

The grade equivalent reading levels for the subjects in the three groups were as follows:
Basic level (20 subjects) 1-3.9 mean 2.7
Medium level (20 subjects) 4.0- 7.3 mean 5.8
High level (20 subjects) 7.5-12.0 mean 9.1
The groups did not differ in mean age or in years of schooling. Overall, the mean age was 28.0 years and the mean school grade completed was 10.5.

In the whole interview there were 62 instances where subjects could exhibit difficulty with segmentation or make errors of segmentation. The errors and difficulties which each subject had were scored. By combining these items, we have an overall measure, Segmental Awareness, which we can use to see the extent to which adults make errors, and the relation of errors to literacy level. The mean number of errors made by subjects in the different groups are given in Table 1. (Changes attributable to dialect or changes in the treatment of contractions were not counted as errors.) From Table 1 we can see that adults do make some errors and that those with higher reading levels make significantly fewer errors.

TABLE 1

Overall segmental awareness.

	basic	medium	high	significance of difference
Mean # of errors per subject.	13.40	10.35	7.40	$p<.001$

4.2 COMPONENTS OF SEGMENTAL AWARENESS

Having established that the segmental awareness score varies with reading level, we next turn to the components of this overall score. What are the components from section 3 which give rise to errors? The mean numbers of errors for the various components are given in Table 2. They have been grouped together in terms of whether there was a significant difference between reading levels. (The significance levels were computed from the raw scores. The scores have been converted to percentages here so that there can be a comparison between the variables.)

There are several questions which we can ask of the data in Table 2. Which components give significant differences between the basic readers and the high readers? Which components in absolute terms give the most difficulty to the basic readers? Which components in absolute terms give the most difficulty to the high readers? Where there are errors, how are they spread through the groups; for example do all subjects make a few errors or are the errors all attributable to a few subjects? We will answer these questions by looking at each variable in turn.

TABLE 2

Percentage of errors for each component.

component	Percentage of errors basic	med	high	all	sig.
Number of words	52.5	41.3	17.5	37.1	$p<.001$
Identifying words	32.0	12.0	16.0	20.0	$p<.001$
Segmentation errors	22.0	19.3	12.0	17.8	$p=.005$
Words into syllables	30.0	18.0	8.0	18.7	$p<.025$
Forgetting sentence	10.0	7.5	1.7	6.4	$p<.02$
Syllables into parts	50.0	35.0	32.5	39.2	n.s.
Repeating sentence	4.2	0.8	0.8	1.9	n.s.
Inconsistency	23.3	23.3	11.7	19.4	n.s.
Slowing down	16.7	16.7	18.3	17.2	n.s.
Diffic. counting words	16.7	11.7	18.3	15.6	n.s.
Errors counting words	15.0	6.6	15.0	12.2	n.s.
Giving first sound	10.0	21.3	15.0	15.4	n.s.

The first five variables gave significant differences between the groups.

Number of words. This was the variable which gave the most significant difference between the groups. This variable

consisted of four questions where subjects were asked for the number of words in a word or phrase, and if incorrect they were asked to give the words. The items were rock and roll, more or less, enough and around. With the first two the error consisted of failing to count the conjunction; with the latter two it consisted of treating each word as two separate words. Subjects in the basic group were incorrect about half the time, and their errors were spread through all four items. Only four subjects in the basic group made no errors. In the high group there were far fewer errors and they were confined almost completely to rock and roll (6 errors) and more or less (5 errors). There were 3 errors with around and none with enough. (In this discussion, unless otherwise mentioned, the results for the medium group came between those for the basic group and those for the high group.)

Identifying specific words. Subjects were asked for specific words in a sentence, such as the second word or the last word. There were few errors where the requested word was the first word (5%), more when it was the second word (10%), and most when it was the last word (35.8%). In the basic group, the errors were spread throughout the subjects. No subject in the high group made more than one error.

Segmentation errors. These were the segmentation errors which subjects made when they were asked to say the sentences one word at a time. Subjects at all levels made errors; only four subjects in all made no errors, one in the basic group and 3 in the high group. The errors will be discussed below where we look at the specific errors made.

Breaking words into syllables. This was a measure of the difficulty which subjects had in breaking down multi-syllabic words into parts. There were 5 words and all posed some difficulty. In the basic group 5 subjects never had any problems, while in the high group 14 never had any problems, 5 had one problem and one had 2 problems. These problems were spread throughout the words.

Forgetting part of a sentence. This consisted of the subject forgetting part of the sentence when asked to give it one word at a time. In the basic group 11 subjects made no errors, 8 made one and one made 2 errors. In the high group the only errors came from 2 subjects who each made one error. (As in all of these variables which covered all 6 sentences, there were no effects of the order of presentation, e.g. there were not more difficulties associated specifically with the first sentence.

The next 3 variables contributed to the significance of the overall error score in that there were more errors in the basic group than in the high group. However, the differences in the separate variables were not significant.

Breaking syllables into parts. This consisted of breaking a monosyllabic word into parts. There were only two instances of this in the interview and had there been more

the difference between the groups might have been significant. Subjects were asked 'Can you break... into parts?' The difficulty usually consisted of the subjects saying something like 'It's only one syllable so I can't break it into parts' or 'I can give you the letters but not the sounds'. The interviewer then persuaded the subject that it was possible;all except 3 subjects finally broke both words into parts.

Repeating sentence. This consisted of having problems repeating word for word a sentence which the interviewer had said once. There were very few errors on this.

Inconsistency. Subjects were asked to give a sentence one word at a time. They were then asked to count the words. An error occurred when subjects segmented inconsistently on these two occasions. There were a few errors in all groups on this.

With the last four variables there was no evidence of differences between the three groups of subjects in terms of the mean number of errors.

Difficulty slowing down. This was difficulty in slowing down when asked to give a sentence one word at a time. There were a few errors and they were spread throughout the subjects.

Difficulty counting words. This was difficulty in counting the number of words in a sentence.

Errors when counting words. This was when there were specific errors of counting the words in a sentence.

Difficulty giving the first sound. This was difficulty with giving the first sounds in words. There were very few difficulties. It was very common for subjects to give the letter names rather than the sound (37% of instances). The groups differed in this, with letter names being used significantly more often in the basic group ($p<.001$). When letter names were given, the subjects were asked for the 'sound not the letter' and if they answered correctly this was not counted as a difficulty.

In summary, the components which gave rise to the most errors and where there were differences between the groups were, firstly, those measuring word segmentation (segmentation errors and number of words), and, secondly, those concerned with measuring smaller units within a whole (identifying a specific word in a sentence;breaking words into syllables; and breaking monosyllables into sound segments). We can characterize these as being problems of identifying 'units within units'. In general, the smaller the unit being broken into parts, the greater the difficulty.An exception to this was identifying the first sound in a word, which did not give a particularly high level of difficulty and which did not distinguish between the groups. The explanation for this may lie in it being a highly practiced schooled activity; it may be to do with the high salience of

initial sounds; or it may be related to the specific items tested. Remembering a sentence and repeating it one word at a time gave low error rates, but,nevertheless, still gave differences between the groups. Problems with slowing down and counting the number of words were found in all three groups, with no differences between the groups.

4.3 NATURE OF THE SEGMENTATION ERRORS.

Turning now to the nature of the segmentations, there are two places where we can examine how subjects segmented:
i) the segmentation errors when breaking down sentences and phrases into words.
ii) the syllabifications of multi-syllabic words.

The segmentation errors and the number of subjects making them are given in Table 3. We have grouped them into different types of errors. The first group, consisting of 7 errors we will refer to as 'errors of convention'. They are (except for enough) composed of two parts each of which exists as a separate word in English. It is, to varying degrees, a convention of English writing that each of these compound words is spelled as one word. (See below.)

The second group of errors are those where a phrase with a unitary meaning has not been correctly analyzed into its component words. (Recall that these words and phrases were not part of the sentences. These items came later in the interview and the errors here are in response to the question 'how many words is that?'.) The third group is where two words have been treated as one. The first two items in this group, a lot and to be, have most of the errors. Compared with the other items in this group, such as is going, they too can be regarded as conventional: they usually appear together, whereas the other items appear in sentences in many combinations. The last group is where a multi-syllabic word has been broken into syllables. Of the 250 segmentation errors, the majority occurred in the first two groups (80%). In these two groups there were also clear and significant differences between the various reading levels with the basic level readers making the most errors (convention errors $p<.001$; analysis of phrases $p<.05$).

The ways in which subjects treated contractions were not regarded as errors and any changes in the contractions were not included in the data on segmentation errors. However, they do give further evidence on people's boundaries of what constitute words. There were three contractions in the sentences: didn't, he's and everything's. All three were always pronounced as contractions by the experimenters. Didn't was kept as a contraction throughout by all subjects

TABLE 3

Errors of segmentation:number of subjects making each error.

	basic	medium	high
MYSELF as 2 words	14	15	7
EVERYTHING as 2 words	14	14	6
INTO as 2 words	12	8	7
AROUND as 2 words	10	9	2
ALWAYS as 2 words	7	7	2
TODAY as 2 words	3	6	1
ENOUGH as 2 words	12	5	0
ROCK'N ROLL as 2 words	8	8	6
MORE OR LESS as 2 words	14	10	5
A LOT as 1 word	3	2	4
TO BE (sentence 2) as 1 word	4	1	3
TO BE (sentence 3) as 1 word	2	2	2
TO CATCH as 1 word	1	0	1
IS GOING as 1 word	0	1	2
THE TRAIN as 1 word	2	0	0
DIDN'T KNOW as 1 word	0	1	0
TO ME as 1 word	1	1	0
EVERYTHING as 3 words	2	0	1
BETTER as 2 words	0	1	0
FAMILY as 2 words	1	0	0

except for one person who first gave it as a contraction but who expanded it to two words did not when asked to give the sentence one word at a time. There was much more variability with he's and everything's. How people treated these contractions is given in Table 4. What we are comparing is how they treated the contraction when they first repeated the sentence with how they treated it later when they gave the sentence one word at a time. They were faced with the problem of whether or not to treat the contraction as a word. Three strategies were adopted: they kept the contraction as a word; the subjects expanded it to two words; or they omitted the 's (a recognized dialect form in Black English:see Cullinan 1974).

Everything's. The experimenter always said the contracted form. Only 12 subjects always did this. Some changed it from the beginning, either expanding it or omitting the 's. In all 30 subjects were consistent in treating it in the same way throughout. The other subjects gave 's when repeating the sentence; later,when giving it one word at a time, 15 expanded it to is, 12 omitted the 's and 3 were variable and uncertain in their responses.

TABLE 4

Subjects treatment of contractions

	basic	medium	high	total
EVERYTHING'S				
'S thruout	2	4	6	12
IS thruout	3	6	4	13
deleted thruout	3	1	1	5
'S becomes IS	5	4	6	15
'S becomes deleted	6	3	3	12
variable	1	2	0	3
HE'S				
'S thruout	2	8	12	22
IS thruout	2	1	0	3
deleted thruout	2	0	0	2
'S becomes IS	6	5	6	17
'S becomes deleted	5	4	1	10
variable	3	2	1	6

He's. There was a similar pattern with he's. The experimenter always said it as he's. Twenty two subjects always did this. A further five changed from the beginning, either expanding it or omitting the 's. The others gave 's when repeating the sentence: when giving it one word at a time 17 expanded it to is and 10 omitted it; the remaining 6 were variable and uncertain in their responses.

Turning to differences in terms of reading level, there were two tendencies which are apparent in the data. For both he's and everything's more high level students accepted the contraction as a word when giving the sentence one word at a time. More basic level students omitted the 's.

There were 4 multi-syllabic words which subjects were asked to 'break into parts'. These were words where the pronunciation suggested by the spoken form differs from the ordinary written form in some way: family, different, every and comfortable. When asked to break such words into parts do people do it according to the written or the spoken form?

The number of subjects pronouncing each word as spoken or written is given in Table 5. From the table we can see that although the words differ a great deal in the extent to which they are treated as written (and one of them, every, does not conform to the trend), the high level readers gave significantly more 'written' syllabifications than the basic level readers. Overall,however 'spoken' syllabifications were given more often than written ones and even the high

level readers gave written syllabifications on only about half the instances.

TABLE 5

Number of subjects syllabifying words as written.

	basic	medium	high	overall
FAMILY	7	9	14	30
DIFFERENT	3	8	12	23
COMFORTABLE	0	4	9	13
EVERY	4	3	1	8

We also included in the interview 2 monosyllabic words, rich and catch which subjects were asked to 'break into parts'. These are two words with different spellings but the same final sound. We scored the breakdowns of these words as to whether they included a /t/ sound in the segmentations. (These were sounds not letters; if,as commonly happened, people gave letters, they were asked for 'the sounds, not the letters'.) Three subjects included a /t/ sound in rich and 2 included a /t/ in catch. Thus, in relation to the orthographic forms, we found no difference in the segmentations of the 2 words.

5. DISCUSSION

Our results show that, in terms of our measures, metalinguistic awareness in adults varies with literacy level.[2] We have characterized the areas which give most difficulty and where there are differences according to reading level as being those of identifying 'units within units'. (Other types of metalinguistic awareness appear not to vary with

---

[2] We also found segmental awareness to vary with reading level in a group of 26 Spanish-English bilingual adults. There was no difference in overall segmental awareness between these bilinguals and a group of monolinguals matched for reading level. This will be reported elsewhere. Another subject population we have looked at, but only briefly, consists of 15 highly educated adults, with at least 4 years of college.(They differ from the subjects reported here in terms of schooling,literacy level and overall ability.) They have fewer segmentation difficulties, but nevertheless do make some errors.

literacy level - as in Cole 1980. See the discussion in Hamilton & Barton 1980.)

The segmental errors which adults make most often are the ones which we have called conventional - where an element of convention enters into the decision as to whether or not the form should be written as one word. Even among non-literate adults there are very few examples of other segmentation errors. In this, the adults' errors are qualitatively different from those found with children, where, for example, errors are found in collapsing phrases such as a drink into one unit. Where we recorded such errors, in 38.6% of instances the subjects also had difficulty in slowing down on the whole sentence; we did not count these cases as errors of segmentation. Such interference may also be found in the child data and our findings provide support for the idea that children's errors are sometimes attributable to other problems with the task than just segmentation, cf. discussion in Holden & McGinitie 1972; Downing & Oliver 1974.

Linguists decide if a sequence of speech in a language constitutes a word by combining grammatical information with the fact of whether the form can occur freely in a sentence or whether it is always bound to another form. It is not always a simple matter to apply these criteria. In English, one of the places a linguist would experience difficulty segmenting the language into words is precisely with cases such as the errors of convention, mentioned above. These exist as problems because the grammatical information and the distributional criteria do not give a clear-cut solution to the particular segmentation problem. Thus, in making conventional errors, our subjects are grappling with the same problems of segmentation which linguists typically find difficult.

The way in which people dealt with contracted forms also varied with literacy level: literates were more likely to treat them as one word, and from their comments they appeared to be influenced by the orthographic form of contractions. With the syllabification of multi-syllabic words, literate adults were more likely to give written forms; nevertheless, they gave the spoken forms on about half the instances. With the two monosyllabic words which differed in orthographic form but not in pronunciation, there were no differences in how they were broken into sound segments. In Ehri & Wilce's study of children (in press), one method of presentation oriented to written language gave differences between such words, while another oriented to spoken language did not. This shows that the methodology used can have subtle effects on responses.

It is not that literate adults have a different way of segmenting, but rather they have an additional way of segmenting. They have the choice of analyzing the spoken form or the written form, and depending on the situation, they will use either one of the ways. Literacy gives an additional way of operating on language. The most striking way in which this was demonstrated did not come from any individual results, but pervaded the whole interviews: this was the greater flexibility of subjects in the high group. They would often comment on the ambiguity of the segmentations but, nevertheless, would come up with a solution that one of them was 'correct': with the conventional errors they often commented that either solution was possible; with the syllabifications they realized that there were two possibilities but gave the written form as being 'correct'. Examples of people's comments are: everything -"That's one word, but it's made up of two words." every -"That breaks into two parts, ev and ry, no wait a minute, I forgot how it was spelled, it should be ev, er and ry, that's three parts." around -"That's one word here."

In general, the skills giving the most differences between literacy levels are the ones where the skills involved are most specifically related to literacy,such as breaking a word into syllables or sounds (cf. Morais et al 1979). The ones not distinguishing between groups are the ones where the skill, although related to literacy, is a more general skill,such as remembering a sentence. It seems that literacy gives very specific skills,as Cole (1980) argues from his work, rather than a general change in people's mode of thinking. The components in our study which we derived from the hypothesis of literacy giving the ability to 'hold in mind',such as repeating a sentence, did not generally vary with literacy level. These too are less specific skills. It may be that schooling, rather than literacy per se is important for developing these abilities.

Where we have found differences, we have interpreted these aspects of awareness as being related to literacy, rather than to schooling or general ability. The question inevitably arises as to whether awareness enhances reading ability or whether reading enhances awareness. Since both reading and metalinguistic awareness consist of many different skills, the answer is likely to be that they interact: that a certain amount of awareness is a prerequisite for reading and that reading then provides additional insights into language. The way to investigate this is to look at very specific skills within the whole constellation of metalinguistic skills. Some beginnings have been made.This approach has been taken by Downing (1979) who has looked at the types of awareness which are prerequisites for reading; by Ehri (1979) who has looked at the interaction of reading and awareness in syllabification; and by Cole (1980) who has

investigated some metalinguistic skills crossculturally. In our own studies, we have shown that certain aspects of segmental awareness are related to literacy, while others are not.

REFERENCES

1. Clark,E.V. Children's awareness of language. in A. Sinclair et al (eds.) 1978.

2. Cole,M. ms. 1980.

3. Cullinan,B.E. (ed.) Black Dialects and Reading. Urbana:National Council of Teachers of English. 1974.

4. Downing, J. Reading and Reasoning. New York:Springer-Verlag,1979.

5. Downing, J. and Oliver, P. The child's conception of a word. Reading Research Quarterly, 1974, 4: 568-582.

6. Ehri,L.C. Linguistic insight:threshold of reading acquisition. In T.G.Waller and G.E.MacKinnon (Eds.), Reading Research:Advances in Theory and Practice,Volume I. New York:Academic Press, 1979.

7. Ehri,L.C. & Wilce,L.S. The influence of orthography on readers' conceptualization of the phonemic structure of words. Applied Psycholinguistics (in press).

8. Fox,B. & Routh,D.K. Analyzing spoken language into words,syllables,and phonemes; a developmental study. Journal of Psycholinguistic Research, 1976, 4, 331-342.

9. Gleitman,H. & Gleitman,L. Language use and language judgment. In C.J.Fillmore,D.Kempler and W.S-Y.Wang (eds.), Individual Differences in Language Ability and Language Behavior. New York:Academic Press,1979.

10. Hamilton,M.E. and Barton,D. A word is a word:metalinguistic skills in adults of varying literacy levels. ms.1980.

11. Holden,M.H. & McGinitie,W.H. Children's conception of word boundaries in speech and print. Journal of Educational Psychology, 1972, 63, 551-557.

12. Hunter,C.S. & Harman,D. Adult Illiteracy in the United States. New York:McGraw-Hill,1979.

13. Karpova,S.N. The Realization of the Verbal Composition of Speech by Pre-school Children. The Hague:Mouton, 1977.

14. Lyons,J. Introduction to Theoretical Linguistics. Cambridge:Cambridge University Press,1968.

15. Mattingly,I.G. Reading, the linguistic process, and linguistic awareness. In J.F.Kavanagh and I.G. Mattingly (eds.) Language by Ear and by Eye: MIT Press,1972.

16. Morais,J.,Cary,L.,Alegria,J. and Bertelson,P. Does awareness of speech as a sequence of phones arise spontaneously? Cognition, 1979, 7, 323-331.

17. Olson,D.R. & Nickerson, N. Language development through the school years: learning to confine interpretation to the information in the text. In K.E.Nelson (ed.), Children's Language, Vol.I. New York: Gardner Press, 1978.

18. Sapir, E. Language. New York: Harcourt, Brace & World, 1921.

19. Sinclair,A., Jarvella, R.J. and Levelt, W.J.M. The Child's Conception of Language, New York:Springer-Verlag,1978.

20. Vygotsky, L.S. Thought and Language. Cambridge, Mass: MIT Press, 1962.